

**Amendments to the Claims:**

Please cancel claims 3, 5, 6 and 11-22 without prejudice.

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Previously Presented) A method for achieving an optimal function of a biochemical reaction network in a cell comprising:
  - (a) calculating optimal properties of a biochemical reaction network by applying a computational optimization method to a list of reactions representing said biochemical reaction network;
  - (b) altering said list of reactions in the biochemical reaction network and re-computing the optimal properties;
  - (c) repeating b) until a desired optimal function is reached;
  - (d) constructing the genetic makeup of a cell to contain the biochemical reactions which result from (c);
  - (e) placing the cell constructed under (d) in culture under a specified environment to obtain a population of cells; and
  - (f) cultivating the cells as in step (e) for a sufficient period of time and under conditions to allow the cells to evolve to the desired optimal function determined under (c), wherein the biochemical reaction network comprises a comprehensive biochemical reaction network.
2. (Original) The method of claim 1, wherein the biochemical network is a metabolic network.
3. (Canceled)
4. (Original) The method of claim 1, wherein the cells are prokaryotic cells.

5. (Canceled)
6. (Canceled)
7. (Original) The method of claim 1, wherein step (d) comprises altering one or more genes in the cell.
8. (Original) The method of claim 7, wherein altering comprises introduction of a gene or genes into the cell.
9. (Original) The method of claim 7, wherein altering comprises modification of an endogenous gene or genes in the cell.
10. (Original) The method of claim 1, wherein the biochemical reaction network comprises a substantially whole biochemical reaction network.

Claims 11-21 (Canceled)